Runway: a personnel passageway elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between scaffolds.

Side-step fixed ladder: a fixed ladder which requires a person getting off at the top to step to the side of the ladder side rails to reach the landing.

Single-cleat ladder: a ladder consisting of a pair of side rails connected together by cleats, rungs, or steps.

Single-rail ladder: a portable ladder with rungs, cleats, or steps mounted on a single rail instead of the typical two rails.

Step stool: a self-supporting, foldable, portable ladder, non-adjustable in length, 80 cm (32 in) or less in height, with flat steps and without a pail shelf, designed to be climbed on the ladder top cap as well as all steps.

Through-step fixed ladder: a fixed ladder which requires a person getting off at the top to step between the side rails of the ladder to reach the landing.

Track-guided personnel hoist system: a hoist system used to transport personnel in a car which is attached to fixed tracks or guide members.

Trestle ladder: a self-supporting ladder consisting of two single ladders hinged or joined at the top to form equal angles with the base.

Trolley line: a horizontal line for direct attachment to a worker's body belt, lanyard, or deceleration device.

SECTION 22

WORK PLATFORMS

22.A GENERAL

22.A.01 Manufactured work platforms shall be erected, used, inspected, tested, maintained, and repaired in accordance with the manufacturers' recommendations as outlined in the operating manual or in accordance with guidance from the Scaffolding, Shoring, and Forming Institute. A copy of the manufacturer's recommendations (operating manual) or guidance from the Scaffolding, Shoring, and Forming Institute shall be available at the work site.

22.A.02 Work platforms shall comply with appropriate access and fall protection requirements of Section 21.

a. All requirements of Section 21.A shall be applied to work platforms and means of access.

b. Standard railing and handrails for work platforms shall be in compliance with the requirements of Section 21 and personal fall protection devices and safety nets shall be in compliance with the requirements of Section 21.C.

c. Ladders used as work platforms shall be in compliance with the requirements of Section 21.D.

22.A.03 Prior to commencing any activity which requires work in elevated areas, all provisions for access and fall protection shall be delineated in the hazard analysis, accepted by the designated authority, for the activity.

22.A.04 The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

a. Scaffolds, platforms, or temporary floors shall be provided

for all work except that which can be done safely from the ground or similar footing.

b. Ladders may be used as work platforms only when use of small hand tools or handling of light material is involved.

c. Ladder jacks, lean-to and prop-scaffolds are prohibited.

d. Emergency descent devices shall not be used as working platforms.

22.A.05 Erection, moving, dismantling, or altering of work platforms shall be under the supervision of a person responsible for job safety.

22.A.06 Work platforms shall not be erected or used in the immediate vicinity of power lines or electrical conductors until such are insulated, deenergized, or otherwise rendered safe against accidental contact. ***> See Section 11.E***

22.A.07 The use of work platforms for the support of an outrigger boom, hoist, well pulley, or any other device or equipment used for hoisting materials will be permitted provided the platform supports, and the individual member to which each device is attached, are reinforced and braced to withstand the additional loads imposed.

22.A.08 Where persons are required to work or pass under a working platform, a screen - consisting of No. 18 gauge US Standard wire 12.5 mm (0.5 in) mesh or the equivalent - shall be provided between the toeboard and the guardrail and extending over the entire opening.

22.B SCAFFOLDS - GENERAL

22.B.01 Capacities.

a. Scaffolds and their components shall be capable of

supporting without failure at least 4 times the maximum anticipated load.

b. Scaffold system components which are subjected to a bending moment (such as outrigger beams with suspended scaffold and counterweights) shall be capable of providing a resisting moment of at least four times the tipping moment.

22.B.02 Design.

a. The dimensions of the members and materials used in the construction of various working platforms or scaffolds shall conform to the sizes shown in the tables and appendices in this manual.

b. Factory-fabricated scaffolds and components shall be designed and fabricated in accordance with the applicable ANSI standard. When there is a conflict between the ANSI standard and this manual concerning the design or fabrication of factory-fabricated scaffolds, the ANSI standard shall prevail.

22.B.03 Scaffolds shall be plumb and level.

22.B.04 Scaffolds (other than suspended scaffolds) shall bear on base plates upon sills or other adequate foundation.

22.B.05 Working levels of work platforms shall be fully planked or decked.

22.B.06 Planking.

a. All planking of platforms shall be either overlapped (minimum 30 cm (12 in)) or secured from movement.

b. Scaffold planks shall extend over their end supports not less than 15 cm (6 in) (unless the planking is manufactured with

restraining hooks or equivalent means) nor more than 30 cm (12 in).

c. Planking on scaffolds shall extend from the toeboard to not more than 35 cm (14 in) from the face of the building or structure unless standard guardrails are installed or personal fall protection systems are used; the maximum distance for outrigger scaffolds shall be 7.5 cm (3 in).

d. Planking shall be supported or braced to prevent excessive spring or deflection and secured and supported to prevent loosening, tipping, or displacement.

e. When a scaffold materially changes its direction, the platform planks shall be laid to prevent tipping.

(1) the planks that meet the corner bearer at an angle shall be laid first, and extend over the diagonally placed bearer far enough to have a good safe bearing but not far enough to involve any danger from tipping, and
(2) the planking running in the opposite direction at an angle shall be laid so as to extend over and rest on the first layer of planking.

22.B.07 Work platforms shall be securely fastened to the scaffold.

22.B.08 Access.

a. An access ladder or equivalent safe access shall be provided.

b. Where a built-in ladder is part of a scaffold system, it shall conform to the requirements for ladders.

c. Climbing of braces shall be prohibited.

22.B.09 When the scaffold height exceeds four times the

minimum scaffold base dimension (and including the width added by outriggers, if used), the scaffold shall be secured to the wall or structure.

a. the first vertical and horizontal tie shall be placed at this point;
b. vertical ties shall be repeated at intervals not greater than 8 m (26 ft) with the top tie placed no lower than four times the base dimension from the top of the scaffold;
c. horizontal ties shall be placed at each end and at intervals not greater than 9 m (30 ft).

22.B.10 The use of brackets on scaffolds shall be prohibited unless the tipping effect is controlled

22.B.11 Use of the following types of scaffolding are permitted if they are designed and constructed in accordance with ANSI A10.8, *Scaffolds*:

a. outrigger scaffolds,
b. needle beam scaffolds,
c. interior hung scaffolds,
d. bricklayer's square scaffolds,
e. float/ship scaffolds,
f. boatswain's scaffolds,
g. window jack scaffolds, and
h. carpenter's bracket scaffolds.

22.C METAL SCAFFOLDS AND TOWERS

22.C.01 Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that required by 22.B.01.

22.C.02 The sections of metal scaffolds shall be securely connected and all braces shall be securely fastened.

22.C.03 A ladder or stairway shall be provided for access and shall be affixed or built into all metal scaffolds and so located that when in use it will not have a tendency to tip the scaffold.

22.C.04 Tube and coupler scaffolds.

a. Tube and coupler scaffolds shall have posts, runners, and bracing of nominal 5 cm (2 in) (outside diameter) steel tubing or pipe: other structural metals, when used, must be designed to carry an equivalent load. The size of bearers (outside diameter) and the spacing of posts shall be as specified below:

Duty	Bearers	Posts
Light	5 cm	1.2 m x 3 m
Medium	5 cm	1 m x 2.4 m
Medium	6.3 cm	1.8 m x 2.4 m
Heavy	6.3 cm	1.8 m x 1.8 m

b. Tube and coupler scaffolds shall be limited in heights and working levels to those permitted in Table 22-1. Drawings and specifications for tube and coupler scaffolds which exceed the limitations in Table 22-1 shall be designed by a registered engineer.

c. All tube and coupler scaffolds shall be constructed to support four times the maximum intended loads, as set forth in Table 22-1, or as specified by a professional engineer.

d. Runners shall be erected along the length of the scaffold and shall be located on both the inside and the outside posts at even heights.

(1) When tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners: if guardrail systems are removed to other levels, extra runners shall be installed to compensate.

(2) Runners shall be interlocked to form continuous lengths and coupled to each post.

(3) The bottom runners shall be located as close to the base as possible.

(4) Runners shall be placed not more than 2 m (6 ft - 6 in) on center.

e. Bearers.

(1) Bearers shall be installed transversely between posts.

(2) When coupled to the post, the inboard coupler shall bear directly on the runner coupler: when coupled to the runners, the couplers shall be kept as close to the post as possible.

(3) Bearers shall extend beyond the posts and runners and shall provide full contact with the coupler.

f. Bracing across the width of the scaffold shall be installed at the ends of the scaffold at least every fourth level vertically and repeated every third set of posts horizontally.

(1) Such bracing shall extend diagonally from the outer post or runner at this level upward to the inner post or runner at the next level.

(2) Building ties shall be installed adjacent to bracing.

g. Longitudinal diagonal bracing across the inner and outer rows of poles shall be installed at approximately a 45^{o} angle in both directions from the base of the end post upward to the extreme top of the scaffold.

(1) Where the longitudinal length of the scaffold permits, such bracing shall be repeated beginning at every fifth post.

(2) On scaffolds where the length is shorter than the height the longitudinal bracing shall extend diagonally from the base of the end posts upward to the opposite end posts and then in alternating directions until reaching the top of the scaffold.

(3) Where conditions preclude the attachment of bracing to the posts, it may be attached to the runners.

22.C.05 Metal frame scaffolds.

a. Spacing of tubular welded panels or frames shall be consistent with the loads imposed.

b. Scaffolds shall be properly braced by cross, horizontal, or diagonal braces (or combination of these) to secure vertical members together laterally, and the cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections shall be made secure.

c. Scaffold legs shall be set on adjustable bases or plain bases placed on mud sills or other foundations adequate to support the maximum rated loads.

d. Frames shall be placed one on top of the other with coupling or stacking pins to provide vertical alignment of the legs.

e. Where uplift may occur, panels shall be locked together vertically by pins or other equivalent suitable means.

f. Drawings and specifications for all frame scaffolds over 38 m (125 ft) in height above the base plates shall be designed by a registered engineer.

22.C.06 Manually propelled mobile scaffolds.

a. All wheels and casters on rolling scaffolds shall have a positive locking device, securely fastened to the scaffold, to

prevent accidental movement.

b. Casters or wheel shall be locked when scaffold is in use.

c. The force necessary to move the mobile scaffold shall be applied as close to the base as practical and provision shall be made to stabilize the tower during movement from one location to another.

d. Rolling scaffolds shall be used only on firm, level, clean surfaces.

e. Free-standing mobile scaffold working platform heights shall not exceed three times the smallest base dimension.

f. No person shall be allowed to ride on manually propelled scaffolds unless all of the following conditions exist:

(1) the ground surface is within 3° of level and free from pits, holes, or obstructions;
(2) the minimum dimension of the scaffold base (when ready for rolling) is at least one-half of the height and outriggers, if used, are installed on both sides of staging;
(3) the wheels are equipped with rubber or similar resilient tires; and
(4) all tools and materials are secured or removed from the platform before the scaffold is moved.

22.D SCAFFOLDS - WOOD POLE

22.D.01 All wood scaffolds 18 m (60 ft) or less in height shall be constructed in accordance with Table 22-2: wood scaffolds over 18 m (60 ft) high shall be designed by a licensed professional engineer and constructed in accordance with such design.

22.D.02 Bracing.

a. Diagonal bracing shall be provided to prevent the poles from

moving in a direction parallel with the wall of the building or from buckling.

b. Full diagonal bracing shall be erected across the entire face of pole scaffolds in both directions; braces shall be spliced at the poles. The inner row of poles on medium and heavy duty scaffolds shall be braced in a similar manner.

c. Cross bracing shall be provided between inner and outer sets of poles in independent pole scaffolds.

d. The free ends of pole scaffolds shall be cross braced.

22.D.03 Splices.

a. Where wood poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section.

b. Splice plates shall be provided on two adjacent sides and shall be not less than 1.2 m (4 ft) in length, overlapping the abutted ends equally, and have the same width and not less then the cross sectional area of the pole: the splice shall be capable of developing strength in any direction equal to the spliced members.

22.D.04 Ledgers and bearers.

a. Ledgers and bearers shall be installed on edge.

b. Ledgers and bearers shall not be spliced between poles.

c. Ledgers shall be long enough to extend over a minimum of two poles and shall be reinforced by bearing blocks nailed to the side of the pole to form a support for the ledger.

d. Bearers shall be long enough to project at least 7.5 cm (3 in) over the ledgers of the inner and outer rows of poles for support.

e. Every wooden bearer on single pole scaffolds shall be reinforced with a 5 mm x 5 cm (3/16 in x 2 in) steel strip, or equivalent, secured to its lower edge throughout the length.

22.D.05 Independent pole scaffolds shall be set as near to the wall of the building as practical.

22.D.06 All pole scaffolds shall be securely guyed or tied to the structure. Where the height or length exceeds 7.5 m (25 ft), the scaffold shall be secured at intervals not greater than 7.5 m (25 ft) vertically and horizontally.

22.E SCAFFOLDS - SUSPENDED

22.E.01 Suspended scaffolds shall be designed, constructed, operated, inspected, tested, and maintained as specified in the operating manual for the device.

22.E.02 Inspections.

a. Suspended scaffold systems shall be inspected prior to being placed in service to determine that the system conforms to this manual and the manufacturer's specifications.

b. Every suspended scaffold shall be tested with twice the maximum anticipated load before being put into operation.
> See 22.B.01

c. Each hoist shall be inspected before, and trial operated after, every installation and re-rigging in accordance with the manufacturer's specifications.

d. Connection and anchorage systems of suspended scaffold shall be inspected at the beginning of each shift.

e. All wire ropes, fiber and synthetic ropes, slings, hangers, hoists, rigging, fall protection equipment, platforms, anchorage points and their connections, and other supporting parts shall be

inspected before every installation, daily thereafter, and periodic while the scaffold is in use.

f. Governors and secondary brakes for powered hoists shall be inspected and tested per the manufacturer's recommendations: at the minimum, inspections shall be made annually.

(1) Inspections and tests shall include a verification that the initiating device for the secondary braking operates as intended.

(2) A copy of the latest inspection and test report shall be maintained on the job site.

g. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

22.E.03 Only personnel trained in the use of the elevating work platform shall be authorized to operate it. Training shall include:

a. reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents, and
b. reading and understanding all decals, warnings, and instructions on the device.

22.E.04 All parts of all suspended scaffolds shall have a minimum safety factor of 4: a minimum safety factor of 6 is required for support ropes.

22.E.05 Support ropes.

a. Support ropes shall be attached at the vertical centerline of the outrigger and the attachment shall be directly over the hoist machine.

b. Support ropes shall be vertical for their entire length; the scaffold shall not be swayed nor the support ropes fixed to any intermediate points to change the original path of travel.

c. Support ropes shall have the fixed end equipped with a proper size thimble and secured by eyesplicing or equivalent means: free ends shall be brazed or secured to prevent fraying.

d. The wire rope for traction hoists shall be of such length that the operator may descend to the lowest point of travel without the end of the wire rope entering the hoist: where the wire rope is inadequate for the lowest descent, provision shall be made to prevent the hoist from running off the wire rope.

e. On winding drum type hoists, running ends of suspension ropes shall be attached by positive means to the hoisting drum and at least four wraps of the rope shall remain on the drum at all times.

f. Support ropes shall be capable of resisting chemicals or conditions to which they are exposed.

g. No welding, burning, riveting, or open flame work shall be performed on any platform suspended by fiber or synthetic rope.

h. Defective or damaged rope shall not be used as life lines or suspension lines: the repairing of wire rope is prohibited.

22.E.06 All suspension scaffold support devices such as outrigger beams, cornice hooks, parapet clamps, or similar devices shall:

a. be made of mild steel, wrought iron, or equivalent materials;
b. be supported by bearing blocks;
c. rest on surfaces capable of supporting the reaction forces imposed by the scaffold hoist operating at its maximum rated load; and
d. be secured against movement by tiebacks installed at right angles to the face of the building whenever possible and secured to a structurally sound portion of the building: tiebacks shall be equivalent in strength to the hoisting rope.

22.E.07 Outrigger beams.

a. Outrigger beams shall be made of structural metal and shall be restrained to prevent movement.

b. The inboard ends of outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except mason's multiple point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.

c. Before use, direct connections shall be evaluated by a competent person who shall affirm that the supporting surfaces are capable of supporting the loads to be imposed. Mason's multiple point adjustable suspension scaffold connections shall be designed by a licensed engineer experienced in scaffold design.

d. Counterweights shall be made of non-flowable solid material, shall be secured to the outrigger beams by mechanical means, and shall not be removed until the scaffold is disassembled.

e. Outrigger beams shall be secured by tiebacks equivalent in strength to the suspension ropes: tiebacks shall be secured to a structurally sound portion of the building or structure and shall be installed parallel to the centerline of the beam.

f. Outrigger beams shall be provided with stop bolts or shackles at both ends.

g. When channel iron beams are used in place of I-beams, the channels shall be securely fastened together with the flanges turned outward.

h. Outrigger beams shall be installed with all bearing supports perpendicular to the beam centerline.

I. Outrigger beams shall be set and maintained with the web in a vertical position.

j. Where a single outrigger beam is used, the steel shackle or clevises with which the wire ropes are attached to the beam shall be placed directly over the hoisting machines.

22.E.08 Hoisting machines.

a. Hoisting machines shall be of a type tested and listed by a nationally-recognized testing laboratory.

b. Each hoist shall contain a name plate(s) stating:

(1) manufacturer's name,
(2) maximum load rating,
(3) identification number, and
(4) wire rope specifications.

c. Powered hoists shall be electric-, air-, hydraulic-, or propane-powered: gasoline-powered hoists are prohibited.

d. All powered hoists shall be equipped with speed reducers and shall be provided with a primary brake and a secondary brake.

(1) the primary brake shall automatically engage whenever power is interrupted or whenever the operator ceases to apply effort;
(2) the secondary brake shall stop and hold the hoist under overspeed or abnormal conditions: every secondary brake shall be periodically tested under simulated conditions in accordance with the manufacturer's recommendations.

e. Each powered hoist shall have its own separate control.

(1) if the control is of the push-button type, it shall be constant pressure;

(2) if the control is of the fixed-position type, it shall have provision for automatic locking when in the off position, or shall be guarded against accidental actuation;
(3) if the control is of the level type, it may be of the constant pressure type or of the fixed-position type.

f. Manual operation of powered hoists may be provided if the hoist is designed so that not more than one person per hoist is required to perform this operation.

(1) During manual operation, a means shall be provided to make the prime mover inoperative.

(2) Instruction shall be provided advising personnel to disconnect the power source before using a manual crank.

g. Manually-operated hoists.

(1) Manual operation shall provide a means to prevent rapid handle movement or fast unspooling; mechanisms used to allow fast unspooling during the erection process shall not be in place on the scaffold.

(2) In the event a controlled descent device is used, it shall not bypass the secondary brake.

(3) All winding drum hoists shall be provided with a driving pawl and a locking pawl that automatically engages when the driving pawl is released.

(4) Gripping-type hoists shall be designed so that the hoist is engaged on the suspension rope at all times, including all travel actuations of the operating lever.

(5) Each winding drum hoist shall be provided with a positive means of attachment of the suspension hoist: the drum attachment shall develop a minimum of four times the rated capacity of the hoist.

(6) Each hoist shall require a positive crank force to descend.

22.E.09 Platforms.

a. Light metal platforms, when used, shall be of a type tested and listed by a nationally recognized testing laboratory.

b. Ladder-type platforms.

(1) Ladder-type platforms shall be constructed in accordance with Table 22-3.

(2) The side stringer for ladder-type platforms shall be of clear straight-grained spruce or materials of equivalent strength and durability.

(3) The rungs shall be of straight-grained oak, ash, or hickory, at least 3 cm (1-1/8 in) in diameter, with 22 mm (7/8 in) tenons mortised into the side stringers at least 22 mm (7/8 in).

(4) The stringers shall be tied with tie rods not less than 6 mm (1/4 in) diameter passing through the stringers and riveted up tight against washers on both ends.

(5) The flooring strips shall be spaced not more than 16 mm (5/8 in) apart except at the side rails where the space may be 2.5 cm (1 in).

c. Plank platforms.

(1) Plank platforms shall be composed of not less than nominal 5 cm x 25 cm (2 in x 10 in) unspliced planks, cleated together on the underside, starting 6 inches from each end at intervals not to exceed 1.2 m (4 ft).

(2) The plank platform shall not extend beyond the hangers more than 30 cm (12 in): a bar or other effective means shall be securely fastened to the platform at each end to prevent its

slipping off the hanger.

(3) The span between hangers for plank platforms shall not exceed 2.4 m (8 ft).

d. Beam platforms.

(1) Beam platforms shall have side stringers of lumber not less than 5 cm x 15 cm (2 in x 6 in), set on edge.

(2) The span between hangers shall not exceed 3.6 m (12 ft) when beam platforms are used.

(3) The flooring shall be of 2.5 cm x 15 cm (1 in x 6 in) material properly nailed; floor boards shall not be spaced more than 12.5 mm (½ in) apart.

(4) The flooring shall be supported on 5 cm x 15 cm (2 in x 6 in) cross beams, laid flat and set into the upper edge of the stringers with a snug fit, at intervals of not more than 1.2 m (4 ft), nailed securely in place.

22.E.10 Suspended scaffolds shall be guyed, braced, guided, or equipped with tag line to prevent swaying.

22.E.11 Two-point suspension scaffolds.

a. Two-point suspension scaffold platforms shall be not less than 50 cm (20 in) nor more than 90 cm (36 in) wide. The platform shall be securely fastened to the hangers by U-bolts or by other equivalent means.

b. The hangers of two-point suspension scaffolds shall be made of mild steel, or equivalent materials, having a cross sectional area capable of sustaining four times the maximum rated load and shall be designed with a support for a standard railing.

c. Two-point suspension scaffolds shall be securely lashed to the structure: window cleaner's anchors shall not be used.

d. The platform on every two-point suspension scaffolds shall be of the light metal-, ladder-, plank-, or beam-type.

e. Two-point suspension scaffolds shall not be joined by bridging.

f. Two-point suspension scaffold platforms, when in use, shall be level within 2.5 cm (1 in) for every 0.3 m (1 ft) of platform length.

22.E.12 Mason's multiple-point adjustable suspension scaffolds.

a. W hen employees on the scaffold are exposed to overhead hazards, overhead protection equivalent in strength to 5 cm (2 in) planking shall be provided on the scaffold not more than 2.7 m (9 ft) above the platform, laid tight and extending the entire width of the scaffold.

b. The scaffold shall be capable of sustaining a load of 2400 Pa (50 psf) and shall not be overloaded.

c. The platform shall be suspended by wire ropes from overhead outrigger beams.

22.E.13 Stonesetters' multiple-point adjustable suspension scaffolds.

a. Stonesetters' multiple-point adjustable suspension scaffolds shall be capable of sustaining a load of 1200 Pa (25 psf) and shall not be overloaded.

b. Stonesetters' multiple-point adjustable suspension scaffolds shall not be used for storage of stone or other heavy materials.

c. The scaffold platform shall be securely fastened to the

hangers by U-bolts or other equivalent means.

d. Stonesetters' multiple-point adjustable suspension scaffolds shall be suspended from metal outriggers, iron brackets, wire rope slings, or iron hooks.

e. When two or more stonesetters' multiple-point adjustable suspension scaffolds are used on a structure, they shall not be bridged one to the other, but shall be maintained at even height with platforms abutting closely.

22.E.14 Working capacities.

a. On suspension scaffolds designed for a working load of 225 kg (500 lb), no more than two employees shall be permitted to work at one time.

b. On suspension scaffolds with a working load of 340 kg (750 lb), no more than three people shall be permitted to work at one time.

22.E.15 Fall protection.

a. Each person supported by a suspended scaffold shall be protected by a Type I body belt or body harness system. ***> See 21.C.01***

b. Body belts and body harnesses shall be attached by lanyard to a lifeline, trolley line, or scaffold structural member: however, when overhead obstructions or additional platform levels are part of a single point or two-point adjustable suspension scaffold, then lifelines shall not be used.

(1) lifelines, when used, shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion;
(2) trolley lines, when used, shall be secured to two or more structural members of the scaffold and shall not be attached to

the suspension ropes;
(3) when lanyards are connected to trolley lines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold shall be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines shall be equal in number and strength to the suspension ropes; and
(4) lifelines, independent support lines, and suspension ropes shall not be attached to one another and shall not be attached to or use the same point of anchorage.

c. To keep the lifeline continuously attached, with a minimum of slack, to a fixed structure, the attachment point of the lifeline shall be changed as the work progresses.

22.F CRANE SUPPORTED WORK PLATFORMS

22.F.01 The work platform and suspension system shall be designed by a registered engineer or a qualified person competent in structural design.

a. The work platform (excluding fall protection systems) shall be capable of supporting, without failure, its own weight and at least five times the maximum intended load.

b. The suspension system shall be designed to minimize tipping of the platform due to movement of the employees on the work platform.

22.F.02 Crane supported work platforms shall meet the following requirements:

a. The scaffold shall be of metal or metal frame construction with a standard railing.

b. A grab rail shall be installed inside the entire perimeter of the personnel platform.

c. Access gates, if installed, shall not swing outward during hoisting and shall be equipped with a restraining device to prevent accidentally opening.

d. Headroom shall be provided which will allow employees to stand upright in the platform.

e. All welding of the work platform and its components shall be performed by a qualified welder familiar with the weld grades, types, and material specified in the platform design.

f. The platform shall be conspicuously posted with a plate or other permanent marking which indicates the weight of the platform and its rated load capacity or maximum intended load.

22.F.03 Rigging.

a. When a wire rope bridle is used to connect the work platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure that the load is evenly distributed among the bridle legs.

b. The hook connection to the platform rigging shall be of a type that can be closed and locked to eliminate the hook throat opening: alternately, an alloy anchor type shackle with a bolt, nut, and retaining pin may be used.

c. Wire rope and rigging hardware shall be capable of supporting, without failure, at least five times the maximum intended load; where rotation-resistant rope is used the slings shall be capable of supporting without failure at least ten times the maximum intended load.

d. All eyes in wire rope slings shall be fabricated with thimbles.

e. Bridles and associated rigging for attaching the platform to the hoist line shall be used only for the platform and the employees and their tools and materials necessary for the work

and shall not be used for any other purpose when not hoisting personnel.

22.F.04 Work platform use.

a. Only cranes with power-operated up and down boom hoists and load lines shall be used to support work platforms; platforms shall be lowered only under power and not by the brake.

b. A thorough inspection by a qualified person shall be made of all hoisting parts prior to each use.

c. A competent supervisor shall observe the operations while personnel are working from crane supported work platforms.

d. The number of employees occupying the work platform shall not exceed the number required for the work being performed.

e. Work platforms shall be used only for employees and their tools and materials necessary for the work; work platforms shall not be used as material hoists when not hoisting personnel.

f. Materials and tools for use during a personnel lift shall be secured to prevent displacement and shall be evenly distributed within the platform while it is suspended.

22.F.05 See also applicable requirements in Sections 16 and 21.G.

22.G FORM AND CARPENTER'S BRACKET SCAFFOLDS

22.G.01 At the minimum, form scaffolds shall be designed in accordance with Table 22-4.

22.G.02 Each bracket, except for wooden bracket form scaffolds,

shall be attached to the supporting formwork or structure by means of one or more of the following:

a. nails,
b. a metal stud attachment device,
c. welding,
d. hooking over a secured structural supporting member, provided the form walers are bolted to the form or secured by snap ties or tie-bolts extending through the form and securely anchored, or
e. for carpenter's bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

22.G.03 Wooden form scaffolds shall be an integral part of the form panel.

22.G.04 Folding-type metal brackets, when extended for use, shall be either bolted or secured with a locking-type pin.

22.G.05 Brackets shall consist of a triangular shaped frame made of wood with a cross-section not less than 5 cm x 7.5 cm (2 in x 3 in) or of 31 mm x 31 mm x 3 mm (1-1/4 in x 1-1/4 in x 1/8 in) structural angle iron.

22.G.06 Bolts used to attach brackets to structures shall not be less than 15 mm (5/8 in) in diameter.

22.G.07 Maximum bracket spacing shall be 2.4 m (8 ft) on centers.

22.G.08 Figure-four form scaffolds shall have bearers consisting of two pieces of 2.5 cm x 15 cm (1 in x 6 in) lumber nailed on opposite sides of the vertical support; bearers shall project not more than 1 m (3.5 ft) from the outside of the form support and shall be braced and secured to prevent tipping or turning.

22.G.09 The knee or angle brace for figure four form scaffolds shall intersect the bearer at least 0.9 m (3 ft) from the form at an

angle of 45° and the lower end shall be nailed to a vertical support.

22.H HORSE SCAFFOLDS

22.H.01 Horse scaffolds shall not be constructed or arranged more than two tiers or 3 m (10 ft) in height: scaffolds shall be 5° feet or less in height and 1.5 m (5 ft) or more in width.

22.H.02 The members of horse scaffolds shall not be less than those specified below:

Members	Dimensions
Horizontal members or bearers	7.5 cm x 10 cm
Legs	5 cm x 10 cm
Longitudinal brace between legs	2.5 cm x 15 cm
Gusset brace at top of legs	2.5 cm x 20 cm
Half diagonal braces	5 cm x 10 cm

22.H.03 Horse scaffolds shall be spaced not more than 1.5 m (5 ft) for medium duty and not more than 2.4 m (8 ft) for light duty.

22.H.04 When arranged in tiers, each horse scaffold shall be placed directly over the horse scaffold in the tier below: the legs shall be nailed or otherwise secured to the planks to prevent displacement or thrust and each tier shall be cross braced.

22.I PUMP JACK SCAFFOLDS

22.I.01 Pump jack scaffolds shall not carry a working load exceeding 230 kg (500 lb); the components shall not be loaded in excess of the manufacturer's recommended limits.

22.I.02 Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles.

22.I.03 Poles.

a. Pole lumber shall be two 5 cm x 10 cm (2 in x 4 in) stock, of Douglas fir, or equivalent, straight-grained, clear, free of cross-grain, shakes, large loose or dead knots, and other defects which might impair strength.

b. Poles shall not exceed 9 m (30 ft) in height.

c. When poles are constructed of two continuous lengths they shall be of 5 cm x 10 cm (2 in x 4 in) stock, spiked together with the seam parallel to the bracket, and with 10d nails, no more than 36 mm (12 in) center-to-center, staggered uniformly from opposite outside edges.

d. If 5 cm x 10 cm (2 in x 4 in) stock are spliced to make up the pole, the splices shall be so constructed as to develop the full strength of the member.

e. Poles shall be secured to the wall by triangular bracing, or equivalent, at the bottom, top, and other points to provide a maximum vertical spacing of not more than 3 m (10 ft) between braces: each brace shall be capable of supporting a minimum of 100 kg (225 lb) tension or compression.

f. When wood scaffold planks are used as platforms, poles used for pump jacks shall not be spaced more than 3 m (10 ft) on center; when fabricated platforms are used that comply with all other provisions of this section, pole spacing may exceed 3 m (10 ft) on center if permitted by the manufacturer.

22.I.04 Brackets.

a. Each pump jack bracket shall have two positive gripping mechanisms to prevent any failure or slippage.

b. Platform brackets shall be fully decked and the planking secured.

c. For the pump jack bracket to pass bracing already installed, an extra brace shall be used approximately 1.2 m (4 ft) above the one to be passed until the original brace is reinstalled.

22.I.05 Not more than two persons shall be permitted at one time upon a pump jack scaffold between any two supports.

22.I.06 When a work bench is used at an approximate height of 1 m (42 in), the top guardrail may be eliminated if the work bench is fully decked, the planking secured, and is capable of withstanding 90 kg (200 lb) pressure in any direction; employees shall not be permitted to use a work bench as a scaffold platform.

22.I.07 A ladder shall provide access to the platform during use.

22.J ELEVATING WORK PLATFORMS

22.J.01 Elevating work platforms shall be designed and constructed in accordance with the appropriate American National Standard Institute standard:

a. ANSI A92.3, *Manually Propelled Elevating Work Platforms*;
b. ANSI A92.6, *Self-propelled Elevating Work Platforms*; or
c. ANSI A92.5, *Boom-supported Elevating Work Platforms*.

22.J.02 Elevating work platforms shall be operated, inspected, and maintained as specified in the operating manual for the equipment.

a. Elevating work platforms shall also comply with requirements of this Section and Section 16.A.

b. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

22.J.03 All boom-supported elevating work platforms shall be equipped with an alarm, or other suitable warning device, at the platform: the alarm shall be in operable condition and shall

automatically activate when the machine base is more than 5° out of level in any direction.

22.J.04 Only personnel trained in the use of the elevating work platform shall be authorized to operate it. Training shall consist of:

a. reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents, and
b. reading and understanding all decals, warnings, and instructions on the elevating work platform.

22.J.05 Before operating the work platform the operator shall:

a. survey the work area for loose or soft ground, ditches, dropoffs or holes, bumps and floor obstructions, debris, overhead obstructions, ground and elevated energy sources, and other possible hazards;
b. ensure the elevating work platform is on a firm, level surface;
c. ensure the work platform is loaded in accordance with the manufacturer's specifications;
d. ensure that outriggers and/or stabilizers are used if required by the manufacturer;
e. ensure that, if the vehicle is on wheels, the wheels are locked or chocked; and
f. ensure that fall protection systems are in place.

22.J.06 Elevating work platforms shall not be used by persons working on energized electrical wiring and/or equipment.

22.J.07 The use of personnel fall protection devices shall be as specified in the manufacturer's operating manual: personal fall protection devices, if used, may only be secured to manufacturer-approved hard points.

22.K VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS

22.K.01 Vehicle-mounted elevating and rotating work platforms shall be designed and constructed in accordance with ANSI standard A92.2, *Vehicle-mounted Elevating and Rotating Aerial Devices*.

22.K.02 Vehicle-mounted elevating and rotating work platforms shall be operated, inspected, tested, and maintained as specified in the operating manual for that piece of equipment.

a. Vehicle-mounted elevating and rotating work platforms shall also comply with requirements of this section and Section 16.A.

b. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

c. If the unit is considered, rated, and used as an insulating device, copies of the electrical insulating components and system tests conducted while the unit is at the work site shall be maintained at the work site.

22.K.03 Only personnel trained in the use of the vehicle-mounted elevating and rotating work platform shall be authorized to operate it. Training shall consist of:

a. reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents, and
b. reading and understanding all decals, warnings, and instructions on the vehicle-mounted elevating and rotating work platform.

22.K.04 Transporting.

a. An aerial lift truck shall not be moved when the boom is

elevated in a working position with personnel in the basket except for equipment which is specifically designed for this type of operation.

b. Before moving an aerial lift, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed positions, except as provided in a, above.

c. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab and the manually operated device at the base of the ladder before the truck is moved for highway travel.

22.K.05 Operating practices.

a. When outriggers are used they shall be positioned on pads or a solid surface and the brakes shall be set.

b. Wheel chocks shall be in place before using an aerial lift.

22.K.06 Fall protection.

a. Belting off to an adjacent pole structure or equipment while working from an aerial lift shall not be permitted.

b. Employees shall always stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

c. A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

DEFINITIONS

Aerial lift: include the following vehicle-mounted aerial devices used to elevate personnel to job sites above the ground: aerial ladder; extensible boom platform; articulating boom platform; vertical tower; and a combination of these devices.

TABLE 22-1

TUBE AND COUPLER SCAFFOLD HEIGHT AND LEVEL LIMITS

Light duty, 2-inch OD bearer
Uniformly distributed load not to exceed 25 psf
Longitudinal post spacing = 3 m (10 ft)
Traverse post spacing = 1.2 m (4 ft)

Working levels	Additional planked levels	Maximum height
1	16	38 m (125 ft)
2	11	38 m (125 ft)
3	6	38 m (125 ft)
4	1	38 m (125 ft)

Medium duty, 2-1/2 in OD bearer
Uniformly distributed load not to exceed 50 psf
Longitudinal post spacing = 2.4 m (8 ft)
Traverse post spacing = 1.8 m (6 ft)

Working levels	Additional planked levels	Maximum height
1	11	38 m (125 ft)
2	1	38 m (125 ft)

Heavy duty, 2-1/2 in OD bearer
Uniformly distributed load not to exceed 75 psf
Longitudinal post spacing = 1.8 m (6 ft)
Traverse post spacing = 1.8 m (6 ft)

Working levels	Additional planked levels	Maximum height
1	6	38 m (125 ft)

TABLE 22-2

WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum nominal size and maximum spacing
of members of single pole scaffolds

	Light duty		Medium duty	Heavy duty
Maximum height of scaffold	20 ft	60 ft	60 ft	60 ft
Maximum uniformly distributed load	25 psf	25 psf	50 psf	75 psf
Poles or uprights	2 in x 4 in	4 in x 4 in	4 in x 4 in	4 in x 4 in
Pole spacing, longitudinal	6 ft	10 ft	8 ft	6 ft
Maximum width of scaffold	5 ft	5 ft	5 ft	5 ft
Bearers or putlogs	2 in x 4 in+ 2 in x 6 in (rough) or 3 in x 4 in (rough)++	2 in x 4 in+ 2 in x 6 in (rough) or 3 in x 4 in (rough)++	2 in x 9 in (rough) or 3 in x 4 in (rough)	2 in x 9 in (rough) or 3 in x 5 in (rough)
Spacing of bearers or putlogs			8 ft	6 ft
Ledgers	1 in x 4 in	1-1/4 in x 9 in	2 in x 9 in (rough)	2 in x 9 in (rough)
Vertical spacing of horizontal members	7 ft	7 ft	9 ft	6 ft 6 in
Bracing, horizontal	1 in x 4 in	1 in x 4 in	1 in x 6 in or 1-$^{1}/_{4}$ in x 4 in	2 in x 4 in
Bracing, diagonal	1 in x 4 in	1 in x 4 in	1 in x 4 in	2 in x 4 in
Tie-ins	1 in x 4 in	1 in x 4 in	1 in x 4 in	1 in x 4 in

all members are used on edge
+ to 3 ft width, ++ to 5 ft width,

TABLE 22-2, continued

WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum nominal size and maximum spacing
of members of independent pole scaffolds

	Light duty		Medium duty	Heavy duty
Maximum height of scaffold	20 ft	60 ft	60 ft	60 ft
Maximum uniformly distributed load	25 psf	25 psf	50 psf	75 psf
Poles or uprights	2 in x 4 in	4 in x 4 in	4 in x 4 in	4 in x 4 in
Pole spacing, longitudinal	6 ft	10 ft	8 ft	6 ft
Maximum width of scaffold	6 ft	10 ft	6 ft	6 ft
Bearers	2 in x 4 in+ 2 in x 6 in (rough) or 3 in x 4 in (rough)++	2 in x 4 in+ 2 in x 6 in (rough) or 3 in x 4 in (rough)++	2 in x 9 in (rough) or 2 in x 10 in (rough)	2 in x 9 in (rough)
Spacing of bearers			8 ft	6 ft
Ledgers	1 in x 4 in	1-1/4 in x 9 in	2 in x 9 in (rough)	2 in x 9 in (rough)
Vertical spacing of horizontal members	7 ft	7 ft	6 ft	4 ft 6 in
Bracing, horizontal	1 in x 4 in	1 in x 4 in	1 in x 6 in or 1-$^{1}/_{4}$ in x 4 in	2 in x 4 in
Bracing, diagonal	1 in x 4 in	1 in x 4 in	1 in x 4 in	2 in x 4 in
Tie-ins	1 in x 4 in	1 in x 4 in	1 in x 4 in	1 in x 4 in

all members are used on edge
+ to 3 ft span, ++ to 10 ft span
* these data are based on one working level and two additional planked levels

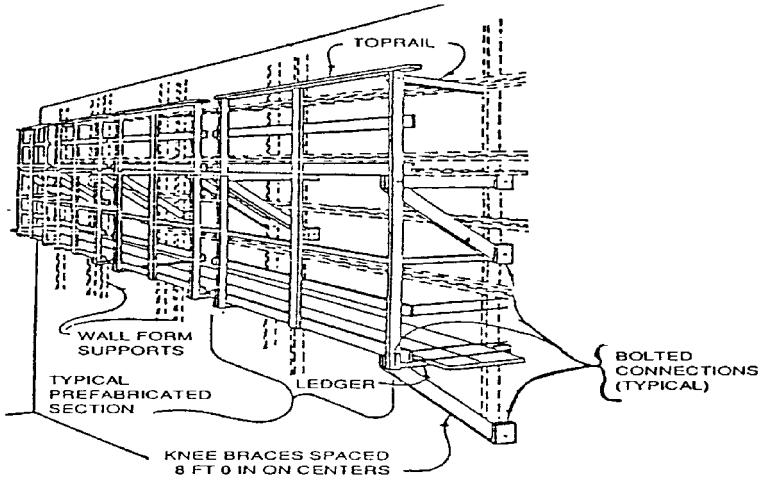
TABLE 22-3
LADDER-TYPE PLATFORMS

Component	Length of platform (feet)				
	12	14 & 16	18 & 20	22 & 24	28 & 30
Side stringers, minimum cross sections (finished sizes, inches): at ends	1-3/4 x 2 3/4	1-3/4 x 2 3/4	1-3/4 x 3	1-3/4 x 3	1-3/4 x 3 1/2
at middle	1-3/4 x 3 3/4	1-3/4 x 3 3/4	1-3/4 x 4	1-3/4 x 4 1/4	1-3/4 x 5
Reinforcing strips	[1]	[1]	[1]	[1]	[1]
Rungs	[2]	[2]	[2]	[2]	[2]
Tie rods: number (minimum)	3	4	4	5	6
diameter (minimum)	1/4 in	1/4 in	1/4 in	1/4 in	1/4 in
Flooring, minimum finished sizes (inches)	1/2 x 2	1/2 x 2 3/4	1/2 x 2 3/4	1/2 x 2 3/4	1/2 x 2 3/4

[1] a 1/8 in x 7/8 in steel reinforcing strip or its equivalent shall be attached to the side or underside, full length
[2] rungs shall be 1 1/8 in minimum diameter with at least 1/8 in diameter tenons and the maximum spacing shall be 12 in center to center

TABLE 22-4

FORM SCAFFOLDS

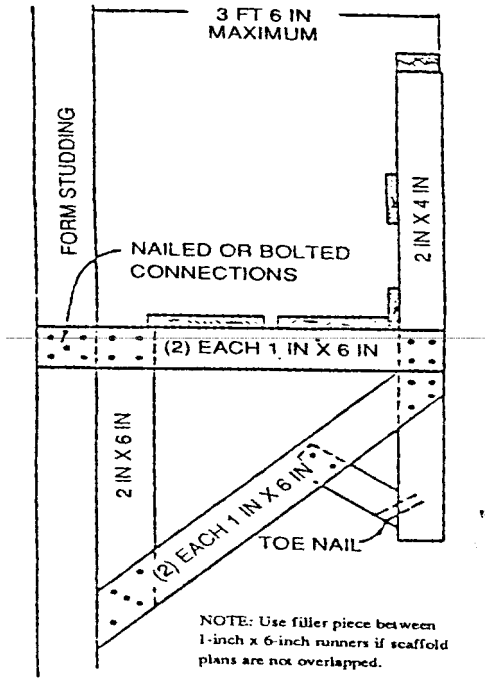


Minimum design criteria for light-duty

wooden bracket form scaffolds

Members	Dimensions
Bracket uprights	2 in x 4 in or 2 in x 6 in
Bracket support ledgers	2 in x 6 in
Maximum bracket width	3 ft 6 in
Bracket braces	1 in x 6 in
Guardrail post	2 in x 4 in
Guardrail height	36 in to 42 in
Midrail	1 in x 6 in
Toeboards	1 in x 6 in
Bracket upright spacing	8 ft 0 in (on centers)

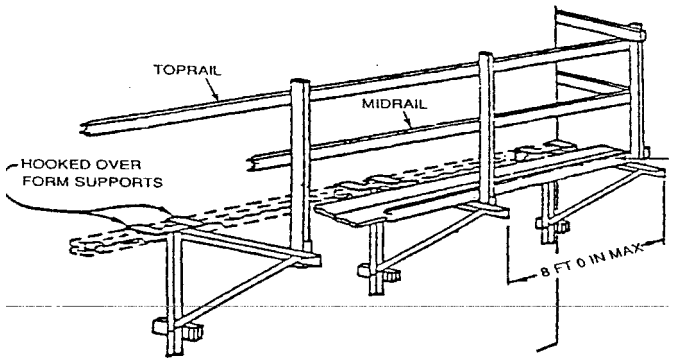
TABLE 22-4, continued



Mimimum design criteria for light-duty figure-four form scaffolds

Members	Dimensions
Bracket uprights	2 in x 4 in or 2 in x 6 in
Bracket outrigger ledgers (two)	1 in x 6 in
Bracket braces (two)	1 in x 6 in
Maximum length of ledgers	3 ft 6 in (unsupported)
Bracket upright spacing	8 ft 0 in (on centers)

TABLE 22-4, continued



Minimum design criteria for light-duty metal bracket form scaffolds

Members	Dimensions
Guardrail post	2 in x 4 in
Guardrail	2 in x 4 in
Guardrail height	36 in to 45 in
Midrail	1 in x 6 in
Toeboards	1 in x 6 in
Metal bracket spacing (metal bracket or scaffold jack dimensions in accordance with manufacturer's design)	8 ft 0 in

Beam platform: a work platform made up of wood beams (oriented vertically).

Bearer: a horizontal member of a scaffold upon which the platform rests and that may be supported by runners.

Bending moment: the overturning effect at a point which is the product of a force and the distance from the point from which the force is applied.

Boatswain's scaffold: a suspended seat designed to accommodate one worker.

Bricklayers' square scaffold: a scaffold made up of a work platform (planking) supported on bricklayers' squares.

Carpenter's bracket scaffold: a scaffold made up of a work platform supported on wood or metal brackets.

Elevating work platform: a vertically-adjustable, integral chassis, power operated work platforms, which may be horizontally extended or rotated relative to the elevating mechanism; an integral frame boom supported power operated elevating work platforms which either telescope, articulate, rotate, or extend beyond their base dimensions.

Figure-four form scaffold: a scaffold consisting of a work platform supported by brackets designed in the shape of a "4."

Float/ship scaffold: a scaffold hung from overhead supports by means of ropes and consisting of a unit having diagonal bracing underneath: the scaffold rests upon and is securely fastened to two parallel plank bearers at right angles to the span.

Form scaffold: a scaffolding system integrated to formwork.

Free-standing scaffold: a scaffold which is independent of and not rigidly attached to a structure.

Horse scaffold: a scaffold composed of work platforms supported by construction horses.

Inside post: the post nearest to the structure against which the scaffold is erected.

Interior-hung scaffold: a suspended scaffold consisting of a work platform suspended from the ceiling or roof structure by fixed length supports.

Ladder-type platform: a platform which resembles a ladder covered by planking.

Ledger: a horizontal scaffold member upon which bearers rest; the longitudinal member which joins scaffold uprights, posts, poles, and similar members.

Mason's multiple point adjustable suspension scaffold: a scaffold having a continuous platform supported by bearers suspended by wire rope hoists from overhead supports.

Metal frame scaffold: a scaffold consisting of a work platform supported by prefabricated metal frames.

Needle-beam scaffold: a platform resting on two bearers that is suspended by a line.

Outrigger scaffold: a scaffold consisting of a work unit supported by outriggers projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside of such building or structure.

Outside post: the post away from the structure against which the scaffold is erected.

Plank platform: a work platform made up of wood boards (oriented horizontally).

Pump jack scaffold: a scaffold consisting of a work platform supported by movable support brackets mounted on vertical poles.

Runner: the lengthwise horizontal bracing or bearing member which supports bearers on tube and coupler scaffolds.

Snap-ties: a concrete wall-form tie, the end of which can be twisted or snapped off after the forms have been removed.

Stonesetters' multiple point adjustable suspension scaffold: a swinging type scaffold having a unit supported by members which is suspended at four points.

Swing scaffold: see two-point suspension scaffold.

Tube and coupler scaffold: a scaffold consisting of a work platform supported by individual pieces of tubing (uprights, bearers, runners, bracing) connected with couplers.

Two-point suspension scaffold (swinging scaffold/swinging stage): a suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped with means to raise and lower the platform.

Vehicle-mounted elevating and rotating work platforms: an elevating and rotating work platform mounted on the chassis of a commercial vehicle.

Window jack scaffold: a supported scaffold consisting of a platform supported by a bracket or jack which projects through a window opening.

SECTION 23

DEMOLITION

23.A GENERAL

23.A.01 Surveys and planning.

a. Prior to initiating demolition activities the following surveys and plan shall be accomplished: ***> see lead and asbestos requirements in Section 06***

(1) an engineering survey - by a competent person - of the structure to determine the structure layout, the condition of the framing, floors, walls, the possibility of unplanned collapse of any portion of the structure (any adjacent structure where employees or property may be exposed shall be similarly checked), and the existence of other potential or real demolition hazards;
(2) an asbestos survey, in accordance with 29 CFR 1926.1101, and a lead survey in accordance with EPA and State requirements, shall be conducted by qualified persons (meeting the EPA model accreditation plan training requirements for the "Inspector" category as specified in 40 CFR Part 763 for asbestos and 40 CFR for lead) to determine the presence and extent of asbestos containing materials in the structure and its components; and
(3) a demolition plan - by a competent person and based on the engineering and lead and asbestos surveys - for the safe dismantling and removal of all building components and debris.

b. The Designated Authority (Government and contractor) shall be provided written evidence that the required surveys have been performed and shall be provided a copy of the demolition plan.

c. All employees engaged in demolition activities shall be instructed in the demolition plan so that they may conduct their work activities in a safe manner.